

QXC-0617-60

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8 July 1960

MEMORANDUM FOR : The Record

SUBJECT : Weight Status - JT11D-20A Engine

1. This report is intended to present the weight status of the D20A (M3.2) engine program as of 1 July 1960 and is based upon the writer's visit to the Pratt & Whitney facilities at West Palm Beach on 30 June through 1 July 1960.

2. Attachment 1 presents a breakdown of the current weight estimate of the first preliminary XJT11D-20A ground test engine along with a list of proposed weight reduction changes.

(a) The YJT11D-20A engine dry weight per specification 3967B is 5657 lbs.

(b) The first preliminary XJT11D-20A ground test engine dry weight is estimated at 6097 lbs.

(c) Summary of Attachment 1:

	<u>Weight (lbs.)</u>	<u>Cumulative Changes Relative to "Y" Eng. Spec. Wt. of 5657 lbs.</u>
Current Prel. "Y" Eng. Est.	6097.0	+440.0
Category 1 changes	-348.6	+91.4
Category 2 changes	-29.0	+62.4
Category 3 changes	-53.0	+9.4
Category 4 changes	-190.0	-180.6

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(d) The four categories of proposed changes are defined as follows:

- Cat. 1 Known and estimated weight savings requiring no test verification but requiring design change release.
- Cat. 2 Redesigns requiring some test verification, refinement, and design change release.
- Cat. 3 Major design changes requiring extensive test verification before completion and release.
- Cat. 4 Considered but not fully evaluated. Generally complex and/or costly.

(e) The contractor indicates that although certain of these proposals which have been evaluated as feasible will be incorporated, time will be required for detail design and design change release. This means that not all of the acceptable changes may be incorporated on the first "Y" or prototype engines. Present planning calls for the most lucrative of these changes (based upon maximum weight reduction per design time expended) to be incorporated first, with the others following on later engines and during overhaul of the early engines. Certain "Y" engines therefore would be overweight relative to specification as defined above for a certain length of time.


3. As indicated by * on Attachment 1, four proposals involving substitution of titanium for stainless steel and waspaloy may reduce engine potential capability from M3.5 to M3.2. The limitation is one of titanium corrosion resulting from exposure to the higher M3.5 inlet temperatures rather than initial structural integrity at the higher temperatures. Further evaluation through testing will be required to firmly establish the reduction in capability associated with these proposed changes which reflect a potential weight saving of 146.2 lbs.

4. Presently, two areas exist incorporating D20B (M3.5) engine potential design capability which are considered as unchangeable. The first of these involves the bleed bypass system. For M3.2 maximum capability, this system could be reduced in size necessitating major design changes to the compressor and turbine sections (already on test) in order to remove approximately two inches in length from each. The second unchangeable area comprises all engine accessories such as pumps and controls which are designed for M3.5 environment and which are subcontracted and currently are in, or very close to, the test phase.

5. Present estimates indicate that the first three flight engines (XJT11D-20A) will be about 300 lbs. over the spec. weight of 5657 lbs. The rate of weight reduction reflected during the prototype engine (YJT11D-20A) program will depend upon the amount of design effort expended in the design change release process as described in paragraph 2e.

6. Lately under consideration and not reflected in Attachment 1 is a proposal for a redesign of the turbine disc cooling air baffling. This proposal reflects a potential weight reduction of 50 lbs.

7. The remote gearbox which is not a part of the engine and therefore not listed in Attachment 1 represents a spec. weight of 125 lbs. including drive shaft. Current estimate places the actual weight of this unit at approximately 80 lbs. due to a material substitution of titanium for steel.


Development Branch
DPD-DD/P

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Attachment:

Considered Design Changes - Weight Reduction

DEV BR/DPD/
7 July 1960

Distribution: Cy 1 & 2 - DB/DPD
3 & 4 - AC/DB/DPD
5 - CH/TAS/DPD
6 - RI/DPD

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